

REMARKS

The rejected claims have been amended and rewritten as new claims in order to simplify the review of this application. Specifically, claim 121 has been amended and rewritten as claim 137; claim 124 has been rewritten as claim 147; and claim 125 has been rewritten as claim 148. New claims 138-146, which are dependent on claim 137, have been added.

Rejection of claims 121, 124 and 125 under 102(e):

Claims 121, 124, and 125 were rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al. (US Patent 5,973,444). The Examiner states:

“Xu et al. disclose at least one vertically oriented carbon nanotube (110); at least one horizontal conductive layer (108), wherein the said horizontal conductive layer is electrically coupled to said vertically oriented carbon nanotube; and wherein the said horizontal conductive layer includes patterned lines (figure 60). With regards to claim 124, the carbon nanotube is conductive (it emits electrons). With regards to claim 125 Xu et al. disclose the patterned lines consisting of copper (column 5 lines 15-25).”

Claim 121 has been rewritten as claim 137 and has been amended without prejudice or disclaimer. Xu et al. fail to disclose, teach, or suggest the limitations of claim 137. For example, claim 137 claims “substantially all of the carbon nanotubes are vertically oriented.” In contrast, the carbon nanotubes disclosed in Xu et al. have a substantially random orientation with respect to the substrate. In fact, Xu et al. teaches away from the present invention, as illustrated by the following:

“The Structures of Carbon Fiber Emitters

The fiber emitters can have a variety of structures and compositions. ... The fiber structures can have various morphologies. The fibers include single wall or multiple-walled tubular structures. These fibers can also be graphitic, single crystal or polycrystalline. Various types of catalytically grown fibers can be produced. Straight fibers are grown at high temperatures, whereas vermicular

fibers (i.e., with an irregular twisting structure) are usually produced at lower temperatures below about 900.degree. C., although straight fibers can also be grown at these low temperatures. The vermicular fibers tend to have an amorphous structure whereas the straighter fibers are more graphitic.” (Col. 9, lines 25-50)

In addition, Xu et al. fails to disclose, teach or suggest the importance of the orientation of carbon nanotubes. Accordingly, the Applicant requests allowance of Claim 137 and requests allowance of its dependent claims.

Rejection of Claim 121, 124, 125 and 134 under 103(a):

Claims 121, 124, 125 and 134 were rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US Patent 6,504,292) in view of Narwanker et al. (US Patent 6,337,289) and Xu et al. (US Patent 5,973,444). The Examiner states:

“Choi et al disclose at least one vertically oriented carbon nanotube in the substrate (10); at least one horizontal conductive layer (5), wherein the said horizontal conductive layer is electrically coupled to said vertically oriented carbon nanotube; and wherein the said horizontal conductive layer includes patterned lines (figure 5b). With regards to claim 124, the carbon nanotube is conductive (it emits electrons). With regards to claim 125 Xu et al. disclose the patterned lines consisting of tungsten. Choi et al. fails to disclose patterned lines. However Narwanker et al. disclose that patterned metal lines are well known in the art (column 9 lines 25-30). Therefore it would have been obvious to one of ordinary [skill] in [the] art at the time the invention was made to combine the teachings of Choi et al. and Narwanker because patterned lines (and the formation of patterned lines) are well known in the art.”

There is no suggestion or teaching in Choi et al., Narwanker et al., or Xu et al. that these three patents and technologies should be combined. Choi et al. “pertains to nanoscale conductive devices and, in particular, to metallized nanostructures particularly useful as electron field emitters and nanoscale conductors” (Col. 1, lines 13-15). Inclusion of patterned lines was not desired or sought in his disclosure. Therefore, Choi et al. fail to disclose, teach, or suggest patterned lines.

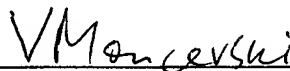
Narwanker et al. "relates to the field of semiconductor processing and more specifically to a method and apparatus for integrating a metal-nitride film in a semiconductor device." (Col. 1, lines 7-10). Inclusion of carbon nanotubes was not desired or sought in his disclosure. Therefore, Narwanker et al. fail to disclose, teach, or suggest carbon nanotube devices with patterned metal lines.

Xu et al. "relates to cold cathode devices comprising electron emitting structures grown directly onto a growth surface on a substrate material." (Col. 1, lines 13-16). As discussed above, Xu et al. fail to disclose, teach, or suggest that substantially all of the carbon nanotubes are vertically oriented.

Accordingly, it would have not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Choi et al. Narwanker et al., and Xu et al. The Applicant requests allowance of Claim 137 and its dependent claims.

Applicant believes the application is in condition for allowance and requests early allowance. Should the Examiner wish to discuss this case in order to further the prosecution, it is requested that the Examiner contact the undersigned at his convenience..

Respectfully submitted,



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